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Variational Calculations for the Effects of Magnetic Dipole-Dipole Interaction in Bose-Einstein Condensates ABRAHAM OLSON, YONG P. CHEN, Purdue University — Employing previously developed variational calculation techniques [1, 2], we explore various possibilities for observing effects of magnetic dipole-dipole interaction (MDDI) in Bose-Einstein condensates (BECs). The effects of MDDI on both in-trap and time-of-flight expansion dynamics are investigated, as well as effects on condensate stability. The variational calculation has been verified to agree well with experimental data in Cr^{52}[3] and Li^{7}[4]. Using current knowledge of Feshbach resonances, we determine the experimental accessibility of observing MDDI effects for the bosonic alkalis and find most favorable results for Li^{7}, K^{39}, and Cs^{133}. We also present calculations for Dy and Er, motivated by advances in cooling such high magnetic moment species. These results would be useful to experimentalists working on dipolar quantum gases.

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